



## Mathematics and CS Seminar

# Quantitative and constructive results on norms in abelian extensions

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Host: Tim Browning

The Hasse norm principle is a local-global principle for norm forms in extensions of number fields. It holds for all cyclic extensions, but may fail in general. We present a useful criterion for the validity of the Hasse norm principle in the case of abelian extensions, which is essentially a reformulation of a theorem of Tate. When combined with counting techniques originally due to Mäki, Wright and Matchett Wood, this criterion allows us to study the distribution of extensions satisfying the Hasse norm principle in families with fixed abelian Galois group, ordered by discriminant and conductor, with qualitatively different results depending on which of these two invariants one uses. When counting by conductor, the criterion can also be used to prove an asymptotic formula for extensions with fixed abelian Galois group in which an arbitrary finite set of elements of the base field have to be norms. In particular, we show that such extensions always exist. This is joint work with Dan Loughran and Rachel Newton. Since then, non-analytic proofs of this last result were found. An algebro-geometric proof was given by Harpaz and Wittenberg, and in joint work with Rodolphe Richard we have used again the criterion mentioned above to give a class-field theoretic proof. We will first survey these results and techniques and then look at some aspects in more detail.

**Thursday, March 31, 2022 02:00pm - 03:00pm**

Heinzel Seminar Room (I21.EG.101), Office Building West



This invitation is valid as a ticket for the ISTA Shuttle from and to Heiligenstadt Station.

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